

REMARKS

The Office Action mailed April 11, 2003 has been reviewed and carefully considered. Claims 13, 16-20, and 37-47 have been amended, Claims 15-16, 23-24, 29-36, 39-40, 46, and 49-50 have been cancelled, and Claims 51-62 have been added. Claims 15 and 49 were cancelled because their limitations were added to independent Claims 13 and 47, respectively, while dependent Claims 16, 23-24, 31-32, 35-36, 39-40, and 50 were cancelled because they depended, either directly or indirectly, from cancelled Claims 15 and 49. Claims 29-30, 33-34, and 46 were cancelled because they were inconsistent with the amendments to independent Claim 13 (see Sect. VI below). Claims 13-14, 17-22, 25-28, 37-38, 41-45, 47-48, and 51-62 are pending, with Claims 13, 47, 51, and 58 being in independent form. Reconsideration and withdrawal of the rejections are requested on the basis of the foregoing amendments and the following remarks.

In the Office Action dated April 11, 2003, the following objections and rejections were made:

- I. The application was objected for as not containing an Abstract (Office Action, ¶1);
- II. The application was objected to because of informalities (Office Action, ¶2);
- III. A statutory-type double patenting rejection under 35 USC §101 of Claim 18 will be made if Claim 17 is found allowable (Office Action, ¶4);
- IV. Claims 13, 21, 29, 33, 37, and 45-46 were rejected under 35 USC §102(b) as anticipated by *Mitsubishi* (Japanese Patent Application Serial No. 06-135294) (Office Action, ¶6);
- V. Claims 13, 21, 37, 45, and 47 were rejected under 35 USC §102(b) as anticipated by *Shibata et al.* (U.S. 5,044,305) (Office Action, ¶7);
- VI. Claims 15, 19, 23, 27, 31, 35, 39, 43, 47, and 49 were rejected under 35 USC §103(a) as unpatentable over *Mitsubishi* as applied in Sect IV, and further in view of *Continental Oil* (Great Britain Patent No. 1,080,523) (Office Action, ¶9);
- VII. Claims 14, 22, 30, 34, and 38 were rejected under 35 USC §103(a) as unpatentable over *Mitsubishi* as applied in Sect IV, and further in view of *Kessel et al.* (US 5,733,608) (Office Action, ¶10);

- VIII. Claims 17-18, 25-26, and 41-42 were rejected under 35 USC §103(a) as unpatentable over *Kessel* as applied in Sect VII, and further in view of *Continental Oil* (Office Action, ¶11);
- IX. Claims 17-18, 25-26, and 41-42 were rejected under 35 USC §103(a) as unpatentable over *Continental Oil* as applied in Sect VI, and further in view of *Kustermann* (US 6,146,690) (Office Action, ¶12); and
- X. Claims 14, 22, 38, and 48 were rejected under 35 USC §103(a) as unpatentable over *Shibati* as applied in Sect V, and further in view of *Kessel et al.* (Office Action, ¶13).

I. Objection to lack of Abstract

The Examiner objected to the application as not containing an Abstract (Office Action, ¶1). In response, an Abstract, based on the Abstract of the PCT application and edited in accordance with U.S. patent practice, has been added. Withdrawal of the objection is respectfully requested.

II. Objection to lack of indication that the application is a national stage application

The Examiner objected to certain informalities in the application; in particular (1) the lack of any indication that the present application is a national stage application of an international application; and (2) the phrase "FIGS. 2-7" on page 4, line 11, should be "FIGS. 2, 3, 4, 5, 6, and 7" (Office Action, ¶2). Both of these informalities have been corrected in the present amendment, and withdrawal of the objection is respectfully requested.

III. Indication of possible future Double-Patenting Rejection

The Examiner indicated that a statutory-type double patenting rejection under 35 U.S.C. §101 would be made to Claim 18, if Claim 17 is found allowable, because both claims recited the same material and depended from the same claim (Office Action, ¶4). The dependencies of Claims 17 and 18 have been amended to depend from different claims in the present amendment. It is respectfully submitted that the present amendment has removed the possibility of a statutory double-patenting rejection.

IV. Rejection of Claims 13, 21, 29, 33, 37, and 45-46 as anticipated under §102(b) by *Mitsubishi*

The Examiner rejected independent Claim 13, as well as Claims 21, 29, 33, 37, and 45-46 dependent thereon, under 35 U.S.C. §102(b) as anticipated by *Mitsubishi* (Office Action, ¶6). In the present amendment, independent Claim 13 has been amended to contain the limitations of dependent Claim 15, which has been canceled. Specifically, Claim 13 now recites that the doctoring means comprises a suction nozzle which extends over the cross-machine width of the web and substantially removes by suction the boundary air layer traveling on the surface of the web. As admitted by the Examiner, *Mitsubishi* does not teach a suction nozzle (see Office Action, ¶9, page 6); therefore, *Mitsubishi* can not anticipate amended independent Claim 13. Withdrawal of the rejection of Claim 13 is respectfully requested. At least because they depend from amended independent Claim 13, it is believed dependent Claims 21, 29, 33, 37, and 45-46 are also not anticipated by *Mitsubishi*; withdrawal of their rejection is also respectfully requested.

V. Rejection of Claims 13, 21, 37, 45, and 47 as anticipated under §102(b) by *Shibata*

The Examiner rejected independent Claims 13 and 47, as well as Claims 21, 37, and 45 depending from Claim 13, under 35 U.S.C. §102(b) as anticipated by *Shibata et al.* (U.S. 5,044,305) (Office Action, ¶7). In the present amendment, independent Claim 13 has been amended to contain the limitations of dependent Claim 15, which has been canceled. Specifically, Claim 13 now recites that the doctoring means comprises a suction nozzle which extends over the cross-machine width of the web and substantially removes by suction the boundary air layer traveling on the surface of the web. *Shibata et al.* does not teach a suction nozzle of any sort; therefore, *Shibata et al.* can not anticipate amended independent Claim 13. Withdrawal of the rejection of Claim 13 is respectfully requested. At least because they depend from amended independent Claim 13, it is believed dependent Claims 21, 37, and 45 are also not anticipated by *Shibata et al.*; withdrawal of their rejection is also respectfully requested.

In the present amendment, independent Claim 47 has been amended to contain the limitations of dependent Claim 49, which has been canceled. Specifically, amended Claim 47 now recites the step of removing a boundary air layer by suction from a suction nozzle in a doctoring means located upstream from the applicator nozzle. *Shibata et al.* does not teach removing a

boundary air layer by suction from a suction nozzle in a doctoring means; therefore, *Shibata et al.* can not anticipate amended independent Claim 47. Withdrawal of the rejection of Claim 47 is respectfully requested.

VI. Rejection of Claims 15, 19, 23, 27, 31, 35, 39, 43, 47, and 49 as obvious under §103(a) over *Mitsubishi* in view of *Continental Oil*

The Examiner rejected Claims 15, 19, 23, 27, 31, 35, 39, 43, 47, and 49 under 35 U.S.C. §103(a) as unpatentable over *Mitsubishi* as applied in Sect IV, and further in view of *Continental Oil* (Office Action, ¶9). In particular, the Examiner alleges that *Mitsubishi* teaches all the elements of these claims "except (1) the suction nozzle and its features (claims 15, 19, 49), and (2) the support of the doctor means" (Office Action, ¶9, page 6), which two elements the Examiner alleges are taught by *Continental Oil*.

In *Mitsubishi*, the boundary air layer is removed by one of (1) an elastic, hollow tube, made of material such as rubber (element 9 in FIG. 4); (2) an elastic, solid tube made of material such as polyurethane (element 9 in FIG. 5); or (3) a rotating "roll," preferably made from metal covered with an elastic material (element 9 in FIG. 6). On the other hand, *Continental Oil*, as shown in FIGS. 2 and 3 thereof, teaches a "thin, rigid edge or knife blade" (page 2, line 36, and element 54 in FIG. 3) which "bears lightly against" the surface of the web (page 2, line 43). This "knife edge" has a narrow, elongated opening (extended along the width of the web) which can be connected to either a vacuum means or a pressure means to provide either suction or pressure, respectively, against the web surface (page 4, lines 26-36).

There is no suggestion nor motivation in either *Mitsubishi* or *Continental Oil* to combine either the elastic tubes or the rotating roll of *Mitsubishi* with the rigid knife blade of *Continental Oil*. Indeed, the descriptions of these components appear to argue against making such a combination. The *Mitsubishi* component is either flexible or, if solid, a smooth roll which rotates with the web itself; whereas the *Continental Oil* component is a sharp, rigid knife edge which is not flexible, not smooth, and does not move with the web against which it is bearing.

The Examiner combines the flexible tube or rotating roll of *Mitsubishi* and the sharp knife edge of *Continental Oil*, in which there is an elongated hole through which air is either sucked or pushed, in order to achieve the doctoring means recited in amended independent Claims 13 and 47,

which has a curved surface and a suction nozzle which removes the air boundary layer on the web surface. But, as stated above, there is no motivation or suggestion in either *Mitsubishi* or *Continental Oil* to combine the air hole of *Continental Oil*'s knife edge with either the pliant, elastic body or the rolling rigid tube of *Mitsubishi*.

Not only is there no suggestion and/or motivation to combine *Mitsubishi* and *Continental Oil*, both references teach away from making such a combination. If the elastic tubes of *Mitsubishi* were provided with an elongated air hole extended along its entire length, the expansion and contraction of the elastic body (caused by the gas pressure in the hole and/or the movement of the web) would disturb or entirely prevent any suction through the air hole, and the edges of the elongated hole in the elastic body would create friction with the web moving against it. If the rotating roll of *Mitsubishi* was provided with a narrow, elongated air hole along its extension, the position of the air hole would be constantly changing and, in fact, would be positioned away from the web most of the time. This would not only generate an uneven doctoring effect at best, it could cause instability in the coating process or in the web itself. Furthermore, it would be difficult to provide suction to an elongated air hole located on a rapidly-rotating roll. The Examiner also suggests having the rotating roll of *Mitsubishi* augmented with a presumably separate suction nozzle (Office Action, page 8). But if a separate suction nozzle was added after (downstream) the doctoring means and before (upstream) the coating curtain, the distance between the doctoring means and curtain coating would be too great, i.e., greater than about 50 mm, and thus the air boundary layer would no longer be prevented from regenerating itself after being scattered by the doctoring means.

Therefore, for at least the above reasons, amended independent Claims 13 and 47 are patentable over the combination of *Mitsubishi* and *Continental Oil*, and withdrawal of their rejection is respectfully requested. Since dependent Claims 15, 23, 43, and 49 have been cancelled in the present amendment, their rejection is moot. At least because dependent Claims 19, 27, 31, 35, and 39 depend from amended independent Claim 13, which is believed to be patentable over the combination of *Mitsubishi* and *Continental Oil*, it is believed Claims 19, 27, 31, 35, and 39 are also patentable over the combination of *Mitsubishi* and *Continental Oil*, and withdrawal of their rejection is also respectfully requested.

VII. Rejection of Claims 14, 22, 30, 34, and 38 as obvious under §103(a) over *Mitsubishi* in view of *Kessel*

The Examiner rejected dependent Claims 14, 22, 30, 34, and 38 under 35 U.S.C. §103(a) as unpatentable over *Mitsubishi* as applied in Sect IV, and further in view of *Kessel et al.* (Office Action, ¶10). At least because they depend from amended independent Claim 13, which is believed in condition for allowance, it is believed dependent Claims 14, 22, 30, 34, and 38 are also in condition for allowance, and withdrawal of their rejection is respectfully requested.

It should also be noted that dependent Claim 14 recites a "gas-injection nozzle ... adapted to blow gas toward the coating mix curtain applied to the web from the applicator nozzle". As admitted by the Examiner, *Mitsubishi* does not teach a gas nozzle (see Office Action, ¶10, page 8). But *Kessel et al.* also does not teach a nozzle which blows gas toward the coating curtain being applied to the web from an applicator nozzle.

Kessel et al. teaches a system in which a substrate is covered with both carrier fluid and coating fluids in order to create a composite layer of coating fluids, and then the carrier fluid is removed by means of a gravity drip assisted by a gas nozzle which blows the carrier fluid off the substrate (see Summary: lines 6-42 in col. 3). In other words, the gas nozzle in *Kessel et al.* blows material **off of the web surface after the web surface has passed under the coating curtain**. As seen in FIG. 1 of *Kessel et al.*, the curtain 48 falls on web 32, which continues around upper roll 58 and then down around the side and bottom of roll 56, where, as the web moves back upwards, gas nozzle 54 blows the carrier fluid falling from the web surface (shown as drops in FIG. 1).

By contrast, the gas-injection nozzle of dependent Claim 14 blows gas toward the coating curtain which the applicator nozzle is applying to the web surface, i.e., the gas nozzle helps apply the coating **to the web surface while it is passing under the coating curtain**. At least for the additional reason that Claim 14 recites a gas nozzle which helps in the application of the coating to the web surface, which the combination of *Mitsubishi* and *Kessel et al.* neither teaches nor suggests, Claim 14 is patentable over the combination of *Mitsubishi* and *Kessel et al.* Withdrawal of the rejection is respectfully requested for this additional reason.

VIII. Rejection of Claims 17-18, 25-26, and 41-42 as obvious under §103(a) over *Kessel* in view of *Continental Oil*

The Examiner rejected dependent Claims 17-18, 25-26, and 41-42 under 35 U.S.C. §103(a) as unpatentable over *Kessel* as applied in Sect VII, and further in view of *Continental Oil* (Office Action, ¶11). At least because they depend from amended independent Claim 13, which is believed in condition for allowance, it is believed dependent Claims 17-18, 25-26, and 41-42 are also in condition for allowance, and withdrawal of their rejection is respectfully requested.

IX. Rejection of Claims 17-18, 25-26, and 41-42 as obvious under §103(a) over *Continental Oil* in view of *Kustermann*

The Examiner rejected dependent Claims 17-18, 25-26, and 41-42 under 35 U.S.C. §103(a) as unpatentable over *Continental Oil* as applied in Sect VI, and further in view of *Kustermann* (US 6,146,690) (Office Action, ¶12). At least because they depend from amended independent Claim 13, which is believed in condition for allowance, it is believed dependent Claims 17-18, 25-26, and 41-42 are also in condition for allowance, and withdrawal of their rejection is respectfully requested.

X. Rejection of Claims 14, 22, 38, and 48 as obvious under §103(a) over *Shibat* in view of *Kessel*

The Examiner rejected dependent Claims 14, 22, 38, and 48 under 35 U.S.C. §103(a) as unpatentable over *Shibati* as applied in Sect V, and further in view of *Kessel et al.* (Office Action, ¶13). At least because they depend from amended independent Claim 13, which is believed in condition for allowance, it is believed dependent Claims 14, 22, 38, and 48 are also in condition for allowance, and withdrawal of their rejection is respectfully requested.


The Addition of Claims 51-57

Independent Claims 51 and 58, as well as Claims 52-57 and 59-62 respectively depending therefrom, have been added in the present amendment. They are allowable for at least the reasons given in the arguments above and they contain no new matter. Their allowance is respectfully requested.

Applicants respectfully submit that this application is in condition for allowance, and such action is respectfully requested.

Respectfully submitted,

COHEN, PONTANI, LIEBERMAN & PAVANE

By 
Michael C. Stuart
Reg. No. 35,698
551 Fifth Avenue, Suite 1210
New York, New York 10176
(212) 687-2770

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ABSTRACT

A curtain coater and a curtain-coating method for coating a moving web of paper or board are described. The curtain coater has an applicator nozzle for applying a coating mix to the surface of the web in the form of a continuous curtain extending uniformly over the cross-machine width of the web. In one aspect, a doctoring means located upstream (in terms of the direction of travel of the web) from the applicator nozzle substantially removes the air boundary layer traveling on the surface of the web. In another aspect, the doctoring means comprises a suction nozzle for removing the air boundary layer. In yet another aspect, a gas nozzle located downstream from the applicator nozzle sprays gas on the coating curtain in order to help apply the coating mix to the surface of the web.